The second part of the report deals with the collections from the Western Indian Ocean; a number of islands lying on the eastern coast of Africa, whose zoological characters were incompletely or altogether unknown, were visited by Dr. Coppinger, and "sufficient materials were accumulated to connect their natural history with that of Seychelles to the northward, and Madagascar to the southward."

Like all the recent publications of the Zoological Department, the present bears ample evidence of the editorial care of the Keeper: we have noted but two misprints, which are both easily corrected by the context; the plates are, on the whole, very satisfactory, but those of the Comatulids ought to have been more highly magnified, and some of the Crustacea would have been better if more work had been put into them by the artist.

We may be pardoned for suggesting to Mr. Miers that the correct form of the technical name of the Sessile-eyed Crustacea is Hedriand not Edriophthalmata.

The Trustees have rendered a great service to science by undertaking the publication of this work; not only have they given an opportunity to the staff to show their powers of work, but they have, we believe, afforded to the Admiralty and to the country a conclusive proof that a large zoological collection need not go here and there to find describers, but that there is a body of men ready at hand to undertake the necessary labour. The fact that some groups are not represented seems to us to be only a proof that the staff might well be increased in numbers.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

May 28, 1884.—Prof. T. G. Bonney, D.Sc., F.R.S., President, in the Chair.

The following communications were read:—

1. "On the Fructification of *Zeilleria* (*Sphenopteris*) *delicatula*, Sternb., sp., with remarks on *Ursatopteris* (*Sphenopteris*) *tenella*, Brongn., sp., and *Hymenophyllites* (*Sphenopteris*) *quadridactylites*, Gutb., sp." By R. Kidston, Esq., F.G.S.

In this paper the author noticed the fructification of three species of Ferns which have been described as belonging to the genus *Sphenopteris*, for two of which he proposed the establishment of new genera. *Sphenopteris delicatula*, Sternb., referred by Stur to *Calymmatotheca*, is made the type of one of these genera, *Zeilleria*, in which the involucres are borne at the extremity of the pinnule-segments, which are more or less produced to form a pedicel; in their earlier condition the involucres are globular, but when mature they split into four valves. In *Calymmatotheca* the fructification consists of a number of elongated sporangia arranged in a circle around a com-

mon point of attachment; in that genus also the fructifying portions are destitute of foliage-pinnules, while in *Zeilleria* there is little difference between the fertile and barren fronds. In the new genus *Ursatopteris*, established upon *Sphenopteris tenella*, Brongn., the barren and fructifying fronds are dissimilar, and the pinnæ of the latter bear two rows of alternate urceolate sporangia, which open at the apex by a small circular pore. Gutbier's *Sphenopteris quadridactylites* was shown to belong to the genus *Hymenophyllites*. The three species were described and their synonymy was indicated and discussed at some length.

2. "On further discoveries of Footprints of Vertebrate Animals in the Lower New Red of Penrith." By George Varty Smith, Esq., F.G.S.

Impressions of footprints were noticed by Prof. Harkness and Mr. Binney on the flaggy beds of the New Red Sandstone of Penrith, but they were of a somewhat indistinct character and compared unfavourably with those previously found at Brownrigg, in Plumpton. The author therefore gave a description of some which have been recently found in a quarry situate to the north of the Alston road, about three and a half miles east of Penrith. The rock consists of strongly false-bedded sandstone underlying the Magnesian Limestone.

Eleven footprints were found in the above quarry. Six of the impressions were discovered *in situ*; three of them (all different) were found on one stone near the top of the quarry; another was taken from a bed 7 feet below that from which the three impressions were taken, and the last two were taken from a bed one foot and a half lower. The remainder were either found by the workmen while quarrying, and set aside, or else discovered by the author and his brother on the newly quarried stones.

The surface of the two last-mentioned beds was in several places covered with footmarks, which in nearly every case took the same direction, namely from west to east.

It has been suggested, from the difference in size and depth of some of the impressions, as compared with the length of pace and form of others, that they represent the impressions of several different species, if not of different genera, of extinct Vertebrates.

The author also found in a quarry of the Penrith sandstone in Whinfell Wood, about three miles to the south-east of Penrith, a cast of some footprints less distinct than those previously found, and in an adjoining quarry a stone with several impressions of an entirely different character.

June 11, 1884.—Prof. T. G. Bonney, D.Sc., F.R.S., President, in the Chair.

The following communications were read:—

1. "On some Zaphrentoid Corals from British Devonian Beds." By A. Champernowne, Esq., M.A., F.G.S.

In this paper several sections of Corals from the Devonian system

were described. They were referred to eight species of *Zaphrentis* (two being, perhaps, rather referable to *Amplexus*), one of *Campophyllum* (?), one of *Lophophyllum* (?), one of *Amplexus*, and one of *Cyathophyllum* (?). The *Amplexus* was identified with *A. tortuosus*, Phillips; two species of *Zaphrentis* were provisionally named *Z. calceoloides* and *Z. subgigantea* (the last being possibly a form of *Z. gigantea*, Lesueur); and for the *Cyathophyllum* the name *C. bilaterale* was suggested. For the remaiuing forms no specific names were proposed.

It was shown that the genus *Zaphrentis* is better represented in British Devonian beds than had hitherto been supposed. At the same time some corals exhibiting bilateral symmetry, and which the author himself had at first taken for Zaphrentidæ, belong to other families. It was shown that the corals of the family in question are distinguished by successive complete floors, well-defined septal characters, notably the discontinuity of the septa as vertical plates where arrested by the floors, the rudimentary condition of the secondary septa, the almost complete absence of vesicular endotheca, and, lastly, the septal fossula and other signs, internal and external, of bilateral or, more rarely, quadripartite symmetry.

2. "On the Internal Structure of *Micrabacia coronula*, Goldf., sp., and its Classificatory Position." By Prof. P. Martin Duncan, M.B. (Lond.), F.R.S., F.G.S.

Fungia coronula, Goldf., a characteristic newer Greensand Coral, found at Warminster and near Dunstable in England, and in the beds of Essen and Le Mans, is the type of the genus *Micrabacia* of Milne-Edwards and Haime, and the external characters have been carefully and accurately described by those authors. They placed the genus in the family of Aporose Corals called Fungidæ by Dana, and in the subfamily Funginæ, near the genus *Fungia* (as restricted by Dana).

The author finds that the internal structure of *Micrabacia coronula*, which he has examined carefully, confirms MM. Milne-Edwards and Haime's view of the classificatory relations of this species. After describing the characters of the base, costæ, septa, and synapticulæ in detail, he finds that there is no theca or true wall. He gives the following amended description of the genus *Micrabacia*. Corallum simple, lenticular, convex above, slightly hollowed out below, resting on the edge of the basal disk. Costæ delicate, simply granular, bifurcating at the calicular margin. Intercostal spaces crossed by synapticulæ, and having a regular series of openings leading upwards into the interseptal loculi. Septa continuous with the intercostal spaces, and formed by the junction of a process from the two nearest costæ, arched, denticulate, solid, unequal. Synapticulæ well developed in series, continuous or discontinuous, terminating moderately high up on the interrupted loculi, and ending as intercostal bars having canal-like spaces between them. Columella rudimentary.

The genus differs from *Fungia* in having the spaces on the intercostal grooves and the bars of the synapticulæ regular.

Some small corals lately brought from the Korean Sea have the shape, synapticulate arrangement, and bifurcating costæ of *Micrabacia*; but the corallum resembles in its bipartite unsymmetrical growth the genus *Dioseris* of the Lophoserinæ.

Micrabacia Fittoni, described by the author in 1866, from the Gault, is placed in the same genus as *M. coronula* with much doubt. The type has been mislaid, and the figures exhibit characters some of which resemble those of *M. coronula*; but in the absence of the specimen, it is not quite certain what are the structures represented.

MISCELLANEOUS.

On the Copulation of Difflugia globulosa, *Duj.*

By Dr. Carl F. Jickeli.

Copulation and conjugation have been but rarely observed in the Rhizopoda, and of the few statements relating to the subject some are susceptible of a different interpretation. Especially since the well-known observation of A. Gruber* upon the process of division in *Euglypha alveolata*, many of these statements may justly be regarded with doubt. For this reason I may here describe a process of copulation in *Difflugia globulosa* which I observed at Jena in December of last year.

One morning I found in a watch-glass, in which I was breeding Infusoria and Rhizopoda, two specimens of the *Difflugia* united. The animalcules clung together by the mouth-openings. Their carapaces were entirely filled with protoplasm, and further four very long pseudopodia, unusually lively in their movements, issued from the point of union of the two individuals. The carapaces were of equal size, but one of them much more transparent than the other. When the creatures were isolated by means of a fine pipette they still remained united. About the same time in the morning of the following day, therefore four-and-twenty hours later, the two animalcules were still united, and both carapaces were quite filled with protoplasm; but the action of the pseudopodia had ceased, and at the point of union of the two mouth-apertures not the smallest plasmatic thread was to be detected. Examination at the end of another twelve hours, or thirty-six hours after the first observation, showed no alteration, but the two carapaces remained, as in the morning, fully occupied by protoplasm without the least trace of pseudopodia. Twelve hours later

* Zeitschr. f. wiss. Zool. 1881.